

CLAIMS

1. A unit-type heat exchangers comprising a plurality of heat exchange portions each having two pipelike headers arranged in parallel to each other at a spacing and a plurality of parallel heat exchange tubes joined at opposite ends thereof to the two headers, the heat exchange portions being arranged longitudinally of the headers and assembled into a unit,

the two headers of the pair of adjacent heat exchange portions having ends thereof positioned in proximity to each other and connected to each other by a connector, the connector being provided at opposite sides thereof with respective recessed portions for said ends of the headers to be fitted therein, said header ends being fitted in the respective recessed portions and joined to the connector.

2. A unit-type heat exchanger according to claim 1 wherein each of the opposite recessed portions of the connector has a peripheral wall provided, at a location not interfering with the heat exchange tube, with a high portion greater than other portion thereof in height as measured from a bottom surface of the recessed portion.

3. A unit-type heat exchanger according to claim 2 wherein said high portion of the peripheral wall of the connector recessed portion has a height of at least 10 mm as measured from the bottom surface of the recessed

portion.

4. A unit-type heat exchanger according to claim 2 wherein said other portion of the peripheral wall of the connector recessed portion has a small height of at least 5 mm as measured from the bottom surface of the recessed portion.

5. A unit-type heat exchanger according to claim 2 wherein said high portion of the peripheral wall of the connector recessed portion has opposite edges which are positioned symmetrically about a horizontal plane extending through the center line of the recessed portion and extending longitudinally of the heat exchange tube, and lines connecting the center line of the recessed portion to the opposite edges make an angle of 180 deg 15 therebetween.

6. A unit-type heat exchanger according to claim 2 wherein said high portion of the peripheral wall of the connector recessed portion has opposite edges which are positioned symmetrically about a horizontal plane 20 extending through the center line of the recessed portion and extending longitudinally of the heat exchange tube, and lines connecting the center line of the recessed portion to the opposite edges make an angle of 120 deg therebetween.

25 7. A unit-type heat exchanger according to claim 1

wherein the opposite recessed portions of the connector are different in size, and the headers of the adjacent heat exchange portions are different in cross sectional size.

5. 8. A unit-type heat exchanger according to claim 1 wherein center lines of the opposite recessed portions of the connector are out of alignment with each other, and center lines of the headers of the adjacent heat exchange portions are out of alignment with each other.

10 9. A unit-type heat exchanger according to claim 1 wherein each of the recessed portions of the connector has a projection formed on an inner peripheral surface thereof, and a peripheral wall of each of the headers has a cutout formed in an end portion thereof for the 15 projection to fit in.

10. A unit-type heat exchanger according to claim 1 wherein a fin is disposed in an air passing space between each pair of adjacent heat exchange tubes, and a separating plate is disposed between the two heat exchange 20 tubes of the adjacent heat exchange portions which tubes are positioned at respective ends thereof immediately adjacent to the connector, the separating plate being parallel to and being spaced apart from said two heat exchange tubes, a fin being provided between the 25 separating plate and each of said two heat exchange tubes.

11. A unit-type heat exchanger according to claim 10
wherein the separating plate has opposite ends each in
contact with the connector.

12. A unit-type heat exchanger according to claim 10
5 wherein the separating plate has opposite end portions
each tapered toward the connector with a decreasing width.

13. A unit-type heat exchanger according to claim 10
wherein the separating plate has opposite end portions
each provided with a protrusion on each of opposite
10 surfaces thereof.

14. A unit-type heat exchanger according to claim 10
wherein the separating plate has a hole or cutout in a
portion thereof other than opposite end portions thereof
for reducing the area of contact of the plate with the
15 fin.

15. A unit-type heat exchanger according to claim 1
which comprises two heat exchange portions, one of the
heat exchange portions being a condenser, the other heat
exchange portion being an oil cooler.

20 16. A unit-type heat exchanger according to claim 1
which comprises three heat exchange portions, one of the
heat exchange portions being a condenser, the other two
heat exchange portion being oil coolers, and the two oil
coolers are used for cooling oils for different uses.

25 17. A vehicle provided with a unit-type heat exchanger

according to any one of claims 1 to 15.